

REMARKS

In the Office Action, the Examiner rejected claim 5 pursuant to 35 U.S.C. § 102(b) as being anticipated by Smith et al. (U.S. Patent No. 5,311,095). Claims 6-8 were rejected pursuant to 35 U.S.C. § 103(a) as being unpatentable over Fiebiger et al. (U.S. Patent No. 5,418,759) in view of Shiraishi et al. (U.S. Patent No. 6,788,620). Applicants respectfully request reconsideration of the rejections of claims 5-8, including independent claim 5.

Independent claim 5 recites transducer material arranged as an array of elements, where the array is a multidimensional array of $M \times N$ elements with both M and N are greater than 1, and at least two electrically conductive matching layers on the transducer material.

Smith et al. do not disclose these limitations. Smith et al. use a single matching layer 40 (Col. 4, line 66 – Col. 5, line 8). A foil 70 is positioned on the matching layer 40 as a ground plane. The examiner alleges that the foil 70 may be interpreted as a matching layer. However, matching layer is a term of art for a layer providing an acoustic impedance step between the piezoelectric material and tissue (e.g. 1.5 MRayl of tissue → 5-10 MRayl matching layer → 35 MRayl of piezoceramic) (See Fiebiger et al. Col. 1, lines 12-24 and Col. 2, lines 33-49; and Shiraishi et al. Col. 3, lines 4-47). To perform this function, materials or composites with a desired density, sound velocity, and thickness are used (e.g. $\frac{1}{4}$ wavelength thickness of polymer or silicone) (Smith et al. Col. 4, line 66 – Col. 5, line 8). The conductive gold or silver foil 70 is not disclosed to have matching layer properties and would not have been understood by a person of ordinary skill to match acoustic impedances. The foil 70 provides a ground plane, likely so thin as to not alter acoustic impedance. In addition, gold or silver have acoustic impedances higher than piezoceramic, thus these materials are not suitable for acoustic impedance matching between tissue and piezoceramics. Smith et al. use one matching layer and a foil, not two or more matching layers.

The Examiner rejected dependent claims 6-8 with references not also used to reject independent claim 5. Accordingly, dependent claims 6-8 are allowable for the same reasons as claim 5 from which they depend. Fiebiger et al. and Shiraishi et al. do not disclose a

multidimensional array of $M \times N$ elements where M and N are both greater than 1. Claim 5 is allowable over Fiebiger et al. and Shiraishi et al.

Claims 6-8 are allowable for an additional reason. A person of ordinary skill in the art would not have used the two-layer structure of Shiraishi et al. with the conductive matching layer of Fiebiger et al. First, Fiebiger et al. use the single conductive matching layer as the ground plane by connection to ground 13 (Col. 3, lines 50-56). No further electrical contacting must be provided (Col. 3, lines 54-55). If another matching layer were added, a non-conductive matching layer would have been used since Shiraishi et al. teach non-conductive matching layers and Fiebiger et al. suggest no further electrical contact. Second, Shiraishi et al. disclose a specific type of two-layer structure (Col. 7, lines 46-60). To provide the structure, ceramic or ceramic and glass with filling material are preferably used (Col. 10, lines 16-30). Inorganic, organic or both types of materials may be used, but a ceramic or ceramic and glass is preferred (Col. 13, line 59 – Col. 14, line 7). Shiraishi et al. prefer a nonconductive material, so a person of ordinary skill in the art would not have used the matching layers of Shiraishi et al. in a conductive matching layer arrangement of Fiebiger et al.

Claim 6 recites kerfs defining the elements and through the transducer material and the matching layers. Fiebiger et al. and Shiraishi et al. do not disclose this limitation. Shiraishi et al. use single element, and Fiebiger et al. do not kerf through the matching layer.

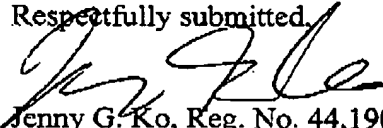
Claim 7 recites three matching layers. Fiebiger et al. and Shiraishi et al. do not disclose three matching layers. Shiraishi et al. mentions a plurality of matching layers, (Col. 3, lines 52-59), but only discloses two.

CONCLUSION:

Applicants respectfully submit that all of the pending claims are in condition for allowance and seeks early allowance thereof. If for any reason, the Examiner is unable to allow the application but believes that an interview would be helpful to resolve any issues, he is respectfully requested to call the undersigned at (650) 694-5810 or Craig Summerfield at (312) 321-4726.

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